

Study of Serum Uric Acid and its Correlation with Intelligence Quotient and Other Parameters in Normal Healthy Adults

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Research Article

Abstract: The study of serum uric acid and its relationship with the intelligence of a person is quite interesting. We have tried to find out correlation of serum uric acid and general intelligence in healthy medical students between age group of 17 to 20 years. We have also studied correlation of serum uric acid with type of food and difference in values in males and females. For present study 100 medical students in the age group of 17 to 20 yrs were selected. All the subjects were thoroughly examined. Standard IQ was determined by IQ test prescribed by M. C. Joshi.¹ The questionnaire comprised of 100 multiple choice questions with time limit of 20 minutes. I.Q. was determined by Weschsler's² formula and as per marks they were grouped from genius to superior, above normal, normal, feeble minded, borderline and mentally deficient. The serum uric acid estimation was done by enzymatic method. Statistical analysis was done. It was observed that in male's serum uric acid level was more than in females. No difference was found between vegetarians and non-vegetarians. There was highly significant positive correlation between serum uric acid and IQ. Higher serum uric acid level was found in those categorized under genius and superior, as compared to those having normal or borderline IQ. Whether IQ of a person and serum uric acid participate common gene loci has to be determined by further study.

Key words: Intelligence Quotient- IQ.

Introduction

Uric acid having similar structure to that of caffeine and theobromine acts as a cerebral stimulant and thought to be responsible for better development of brain and more intelligence. Intelligence results from interplay between hereditary and environmental factors. Some psychologists emphasize genetic factors as having major significance. The higher the I.Q. the more brilliant is the child and is more capable of higher performance. Many workers have tried to find out whether there is any relationship between the intelligence and serum uric acid. This is based on assumption that comparatively more intelligent persons have higher levels of uric acid. A list of prominent leaders whose names and achievements are permanently recorded in the history. Alexander the great, Kubla Khan, Darwin, Harvey, Newton, Sydenham, Wolsley and Ellis were victims of gout. This association cannot be mere co-incidence. Gout is

associated with high level of serum uric acid. This association led to comparative study of serum uric acid with achievements and social status. **Darwin – Mendal De Vries** theory of evolution provides a framework for undertaking the evolution in man. Man has strikingly exceeded other animals in intellectual development. The basic difference between man and lower animals is that in man cerebral cortex is well developed having enormous growth and convolutions of cortex and also frontal prominence, which is considered to be the highest seat of intelligence. In man uric acid is derived from purine base as an end product of purine metabolism. When excess uric acid is produced from purine, its metabolism is hazardous because there is danger of formation of calculi and retention of uric acid leading to gout. In man uricase enzyme is not present in the body that is why oxidation of uric acid to allantoin does not occur. Uric acid having similar structure to that of caffeine and bromine acts as a cerebral stimulant. This uric acid is thought to be responsible for better development of brain and intelligence. Intelligence quotient (IQ) is the measurement of quality and quantity of intelligence. The higher the IQ more is the brilliance and greater is the performance. Present study is carried out to find out correlation of serum uric acid and IQ as well as relationship with sex and type of food.

Material and Methods

100 medical students in the age group of 17 to 20 years were selected. All subjects were thoroughly examined with particular emphasis on dietary habits, beverages consumed, and family history of gout and hypertension. The intelligence quotient was determined by a group IQ test prescribed by M. C. Joshi.¹ The questionnaire comprised of 100 multiple choice questions – each question carrying one mark with time limit of 20 minutes. I.Q. was determined by Weschsler's² formula and as per marks they were grouped as,

Sr. No.	Classes	IQ
1.	Genius	161 and above
2.	Superior	141 to 160
3.	Above normal	121 to 140
4.	Normal	81 to 120
5.	Feeble minded	61 to 80
6.	Border line	41 to 60
7.	Mentally deficient	40 and below

The serum uric acid was determined by enzymatic method.
 Mean Serum uric acid was 5.3 mgm/100ml with 1.191 SD

Results

Mean Serum uric acid was 5.3 mgm/100 ml with 1.191 SD

Table 1: Showing Relationship of Mean Serum Uric Acid Level with Sex

Sex	Mean Serum Uric Acid in mgm / 100ml						Total
	(2 – 3)	(3 – 4)	(4 – 5)	(5 – 6)	(6 – 7)	(7 – 8)	
Males	3	12	10	24	17	7	73
Females	1	3	11	9	3	--	27

Table 2: Statistics for relationship of Mean Serum Uric Acid Level with Sex

Sex	No. of Students	Means Uric Acid mg/100ml	S.D.	Range	Standard Error of Diff.
Males	73	5.5	1.25	3 to 7.4	
Females	27	5.0	1.02	2.8 to 7.0	- 242

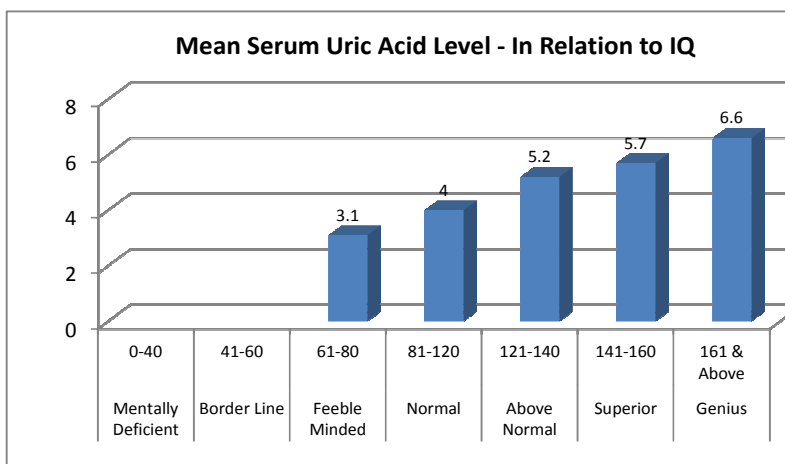
(P is less than 0.05)

In males serum uric acid is more as compared to females which is statistically significant. No difference was found in between vegetarians and non vegetarians.

Table 3 Relationship of Mean Serum Uric Acid with IQ

Sr. No.	IQ	Category	Mean Serum Uric Acid in mgm / 100ml						Total
			(2 – 3)	(3 – 4)	(4 – 5)	(5 – 6)	(6 – 7)	(7 – 8)	
1.	161 – 200	Genius	--	--	1	7	13	7	28
2.	141 – 160	Superior	--	--	5	11	6	--	22
3.	121 – 140	Above Normal	--	--	5	14	1	--	20
4.	81 – 120	Normal	2	12	10	1	--	--	25
5.	61 – 80	Feeble Minded	2	3	--	--	--	--	5
6.	41 – 60	Border Line	--	--	--	--	--	--	--
7.	Below 40	Mentally Deficient	--	--	--	--	--	--	--

There is a highly significant positive correlation between serum uric acid and IQ.



Discussion

In man cerebral cortex is well developed, having enormous growth and convolutions of cortex and also frontal prominence which is considered to be the seat of higher intelligence, which is absent in lower animals because of presence of uricase enzyme. There is a considerable relationship between a person's degree

of intelligence and range of activities, level of achievement and the depth of understanding. Gout is one of the oldest recorded diseases of mankind. Orowan³ suggested that Uric acid like caffeine and theobromine might have some stimulating action on central nervous system. According to Florkin and Duchateay⁴ the loss of Uricase in the evolutionary line

leading to man and higher apes has been considered fortuitous since the hyperuricemia has stimulated brain development. The value of mean serum uric acid in males is $5.5\text{mg}/100\text{ml} \pm 1.25$ standard deviation and in female's $5\text{mg}/100\text{ml} \pm 1.02$. Serum uric acid values are higher in males than females. It is worth pointing out that the occurrence of clinical gout is more predominant in males as compared to females. The same findings were found by Seegmiller⁵ et al and Mikk elson⁶ et al. In vegetarian and non vegetarian subject there is not much difference in serum uric acid level. It might be due to the fact that the non vegetarians did not consume non vegetarian meals regularly. After finding IQ by prescribed Weschsler's formula the subjects were divided into different categories according to their IQ score. 28 students categorized under genius have got higher serum uric acid levels as compared to others. Mean serum uric acid in genius category was 6.6 ± 0.584 mgs/100ml. In normal category 5.7 ± 0.263 mgs/100ml in 22 students. In above normal categories 5.2 ± 0.394 mg/ml i.e. in 20 students. In normal category 40 ± 0.693 mgs/100ml in 25 students and lastly in category of feeble minded students i.e. in 5 students it was found to be 3.1 ± 0.316 mgs/100ml. The difference was statistically analyzed and standard error of difference was statistically significant. It can be concluded that there is definite relationship between the serum uric acid level and intelligence of a person. This fact is supported by Staton and Hearson,⁷ who found higher values in 14 persons who scored more in intelligence tests in U.S. army. Kasal⁸ et al also found in 62 medical students having much higher serum uric acid who were academically better. Vajpeyi⁹ et al found high serum uric acid levels in few doctors who secured good works in their class. There is definite relationship between mean serum uric acid and intelligence of a person. This has been supported by other workers. Inomye E Parke KS and Asaka A¹⁰ performed blood serum uric acid levels and IQ in twin families and found significant relationship between the serum uric acid levels and IQ, showing a contribution of partly courmon gene loci to the two traits. Uric acid highly affects the development of human brain. It therefore appears that the IQ of a person could be predicted by finding out his serum uric acid value.

Conclusion

A positive correlation was found in serum uric acid levels and IQ. Higher mean serum uric acid was found in those categorized under genius and superior as compared to those who were categorized as normal and borderline subjects. It has to be studied in details to find out serum uric acid and IQ having contribution of partly common gene loci to these two traits. Whether IQ of a person could be predicted by finding out serum uric acid values needs to be decided by further extensive study. Higher serum uric acid level was found in those categorized under genius and superior as compared to those who were categorized as normal and border line subjects. It has to be studied extensively to find out serum uric acid and IQ having contribution of partly common gene loci to their two traits. Whether IQ of a person could be predicted by finding out serum uric acid value needs to decide by further study.

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